## ABSTRACT

### IDENTIFYING UNCORRECTABLE CODEWORDS IN A
### REED-SOLOMON DECODER FOR ERRORS AND ERASURES

In a Reed-Solomon decoder handling both errors and erasures, an uncorrectable codeword is identified when any one or more of six conditions (a) to (f) is satisfied:

(a) no solution to key equation $\sigma(x)T(x) \equiv \omega(x) \bmod x^{2T}$;

(b) $\deg\sigma(x) \neq$ nerrors;

(c) error and erasure locations coincide;

(d) $\deg \omega(x) \geq$ nerrors + nerasures;

(e) nerasures + 2*nerrors > 2T; and

(f) an error location has a zero correction magnitude.

Nerrors and nerasures represent, respectively, a number of errors and erasures, with respect to an error locator polynomial $\sigma(x)$ and an erasure locator polynomial $\Lambda(x)$, 2T is the strength of a Reed-Solomon code, $\omega(x)$ is an errata evaluator polynomial, and T(x) is a modified syndrome polynomial. A detector circuit 300 comprises a logic unit 350 which tests for the conditions (a) to (g), and an indicator unit 360 which provides a corresponding output.

[Figure 2]